H/T Scaling of the Magnetoconductivity of Silicon MOSFETs

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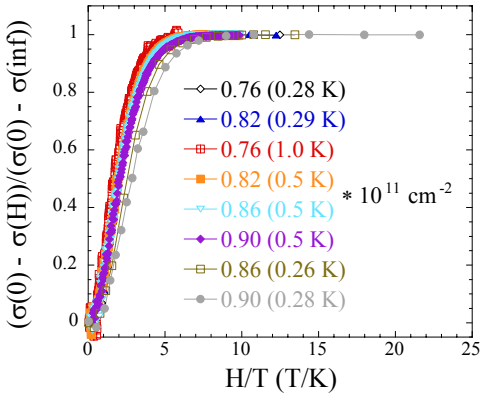
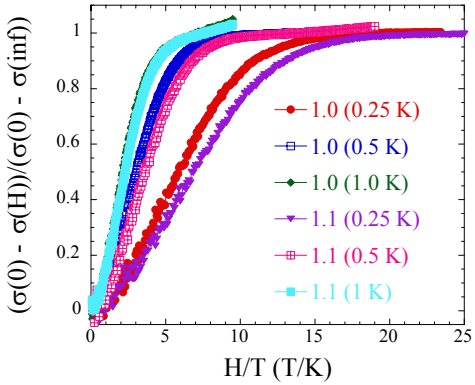
Experiments in strongly interacting high mobility two dimensional (2D) systems have revealed unexpected metallic behavior at electron or hole densities above some critical density. At electron densities near and below the critical density, we have recently found that the in-plane magnetoconductivity of a high-mobility silicon MOSFET scales as H/T. Deviations from this simple scaling behavior are apparent at higher electron densities in the metallic range. Our results strongly suggest that the critical density separates two distinct phases.



At electron densities near and below n_c (~0.9 10^{11} cm^{-2}) magnetoconductiviy scales as H/T.



Magnetoconductiviy shows clear deviations from simple H/T scaling behavior at higher electron densities.

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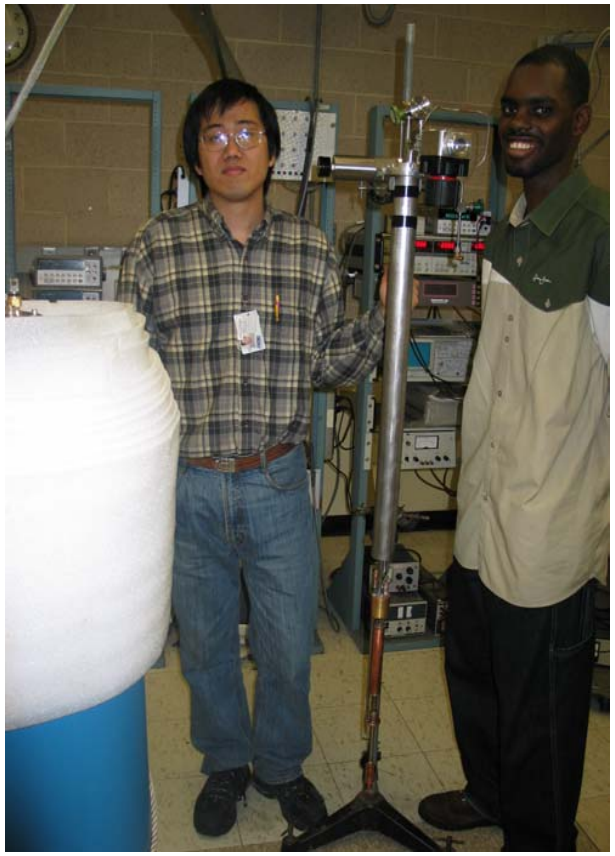
Education:
Two undergraduates (David Graybill and Kurt James), one graduate student (Jingqiao Zhang), and one postdoc (Yeekin Tsui) contributed to this work. Undergraduate Kurt James presented part of our new findings in silicon MOSFETs at the American Physical Society Annual March Meeting 2003. Currently, one of the projects of the group is to build a helium-3 refrigerator insert to do microwave studies.



Jingqiao Zhang (left) and Kurt James (right) are working on the home made helium-3 refrigerator insert (mounted on a stand) in the laboratory of Professor Sergey Vitkalov.